

**WHAT IS CLAIMED IS:**

1. An apparatus for placing a fiber on a substrate, the apparatus comprising:

a base;

a supporting member attached to the base;

5 a first placement head attached to the support member, the first placement head

having an extendable plunger slidably coupled to the first placement head, the first placement head having an airflow channel formed proximate to a tip of the plunger;

a substrate holder attached to the base,

10 wherein, during operation of the apparatus, the substrate holder holds a substrate beneath the plunger mechanism, and

wherein, during operation of the apparatus, a vacuum source draws a flow of air through the airflow channel, and

wherein, during operation of the apparatus, the placement head picks up and holds a fiber against the plunger tip using forces associated with the flow of air.

15 2. The apparatus of claim 1, wherein the substrate holder further comprises:

grooves formed in a surface of the substrate.

3. The apparatus of claim 2, wherein the substrate holder comprises a movable stage

20 configured to move beneath and perpendicular to the first placement head, and

wherein, during operation of the apparatus, the longitudinal axis of the substrate grooves are held parallel to the longitudinal axis of the fiber and the plunger.

4. The apparatus of claim 3, wherein the substrate carrier further comprises:

a removable substrate pallet,

wherein during operation of the apparatus, the substrate is held on the substrate pallet and the substrate pallet is held on the substrate carrier.

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5. The apparatus of claim 2, further comprising:

a fiber holder attached to the supporting member,

wherein during operation the fiber holder holds a fiber between the plunger mechanism and a substrate groove, and wherein the fiber holder holds the fiber in

10 longitudinal alignment with the plunger tip and the substrate groove.

6. The apparatus of claim 2, wherein the plunger further comprises:

a groove-shaped tip, wherein during operation of the apparatus, the fiber is drawn against the groove-shaped tip by forces associated with the flow of air through the first  
15 placement head.

7. The apparatus of claim 3, wherein the apparatus further comprises:

a second placement head attached to the support member, the second placement head having a second extendable plunger slidably coupled to the second placement head, the  
20 second placement head having a second airflow channel formed proximate to a tip of the second plunger, wherein the second plunger is longitudinally aligned with the fiber held by the fiber holder and the grooves of the substrate held by the substrate holder,  
the second extendable plunger further comprising:

a groove-shaped tip, wherein during operation of the apparatus, the vacuum source draws a flow of air through the second airflow channel and the second placement head picks up a section of the fiber and holds the fiber within the groove-shaped tip of the second plunger by forces associated with a flow of air through the second placement head.

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8. The apparatus of claim 1, wherein the fiber holder comprises a movable stage configured to move perpendicular to the first placement head.

9. The apparatus of claim 8, wherein the fiber holder further comprises:

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a removable fiber magazine, wherein during operation of the apparatus, the fiber magazine holds a plurality of fibers and the fiber magazine is held on the fiber holder.

10. The apparatus of claim 9, wherein the fiber magazine further comprises:

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a plurality of grooves formed in a bottom surface of the magazine, each of the plurality of grooves holding one of the plurality of fibers; and  
at least one airflow hole formed in the bottom of each of the plurality of grooves, wherein during operation of the apparatus, a vacuum source draws a flow of air through the airflow holes and holds each of the plurality of fibers within a corresponding one of the plurality of grooves.

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11. An apparatus for handling optical fibers, comprising:

a fiber magazine having a plurality of grooves formed in a surface of the magazine, wherein during operation of the apparatus, each of the plurality of grooves holds one of the plurality of fibers;

at least one airflow hole formed in the bottom of each of the plurality of grooves,  
wherein during operation of the apparatus, a vacuum source draws a flow of air  
through the airflow holes, the forces associated with the flow of air holding the fibers within  
the plurality of grooves.

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12. The apparatus of claim 11, wherein the fiber magazine further comprises:

an airflow plenum formed in a central region of the magazine, the airflow plenum  
connected to one or more of the airflow holes formed in the grooves,

wherein, during operation of the apparatus, a vacuum source draws air from the  
10 plenum and from the airflow holes.

13. The apparatus of claim 12, wherein, during operation of the apparatus, an end of each of  
the plurality of fibers is held protruding beyond a front edge of the fiber magazine, and  
wherein, each time the end of a fiber is placed by the apparatus the corresponding fiber being  
15 held in the corresponding magazine groove is dislodged from the magazine groove.

14. The apparatus of claim 12 wherein the fiber magazine comprises a removable fiber  
magazine.

20 15. The apparatus of claim 12, further comprising:

an axle for holding spools, wherein during operation, at least one spool is placed on  
the axle, each spool holding an opposite end of a fiber that is being held within one of the  
plurality of grooves.

16. The apparatus of claim 15, wherein the spools are removable from the fiber magazine.

17. A method of placing a fiber on a substrate, comprising:

holding a substrate having a groove beneath a first placement head;

5 flowing air past a plunger slidably coupled to the first placement head;

picking up and holding a fiber against a tip of the plunger using forces associated with the flow of air; and

extending the plunger to place the fiber into the substrate groove.

10 18. The method of claim 17, further comprises:

moving the substrate with a first movable stage, the first movable stage configured to move beneath and perpendicular to the first placement head.

19. The method of claim 18, wherein holding a substrate having a groove further comprises:

15 holding a longitudinal axis of the substrate groove parallel to the longitudinal axis of the fiber and the plunger.

20. The method of claim 18, wherein moving the substrate with a movable stage further comprises:

20 holding the substrate on a removable substrate pallet; and

holding the removable substrate on the first movable stage.

21. The method of claim 18, further comprises:

holding a fiber between the plunger mechanism and the substrate in longitudinal alignment with the plunger tip and the substrate groove.

22. The method of claim 18, wherein picking up and holding a fiber against a tip of the plunger further comprises:

picking and holding a fiber against a groove-shaped tip.

23. The method of claim 22, wherein flowing air further comprises:

flowing air through a channel formed proximate to the groove-shaped tip; and

drawing air through the channel during operation of the apparatus.

24. The method of claim 23, further comprises:

holding the substrate having a groove beneath a second placement head;

flowing air past a second plunger slidably coupled to the second placement head;

picking up and holding a fiber against a tip of the second plunger using forces associated with the flow of air; and

extending the plunger to place the fiber into a second substrate groove.

25. The method of claim 21, wherein holding a fiber further comprises:

holding a fiber with a fiber magazine; and

moving the fiber magazine with a movable stage configured to move perpendicular to the first placement head.

26. The method of claim 25, further comprises:

holding a plurality of fibers with the fiber magazine.

27. A method of presenting optical fibers to an apparatus, comprising:

holding a plurality of fibers within a plurality of grooves formed in a surface of a  
5 fiber magazine,

wherein holding further comprises:

drawing air through at least one airflow hole formed in the bottom of each of  
the plurality of grooves, the forces associated with the flow of air being used to hold the  
fibers within the plurality of grooves.

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28. The method of claim 27, wherein drawing air further comprises:

drawing air through an airflow plenum formed in a central region of the fiber  
magazine, the airflow plenum connected to one or more of the airflow holes formed in the  
grooves.

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29. The method of claim 27, wherein holding a plurality of fibers further comprises:

holding an end of each of the plurality of fibers to protrude beyond a front edge of the  
fiber magazine, and

dislodging a fiber from a one of the plurality of grooves each time an end of the  
20 corresponding fiber is manipulated by the apparatus.

30. The method of claim 27, further comprising:

mounting at least one spool proximate to the fiber magazine, each spool holding an opposite end of a fiber that is being held within one of the plurality of grooves, wherein the spool is removable from the fiber magazine.

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